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ICESat (GLAS) Science Computing Facility Document Series

Volume 2
SCF Interface Control Document
Version 12.0

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SUMMARY OF CHANGES SINCE VERSION 2.0

p. 1 Document status and schedule revised

p. 7 A PAN with the disposition message of “SUCCESSFUL” means that the corresponding files can be removed from the output cache. If the PAN contains a different disposition message, then this indicates that a problem occurred, and an email will be sent describing the nature of the problem. The I-SIPS will investigate the problem, and the files in the distribution that were not transferred successfully will be transferred again.

p. 7 A quick look request may be submitted to the I-SIPS with approval of the Change Control Board (CCB).

p. 9 Data types have been defined for the following files:
- Rev Tables: ANC28
- Reference Orbit Tables: ANC42
- Track Files: ANC43

p. 9 Quick look granules that can be created will be processed immediately and will be placed in the output cache along with a PDR containing the SCF Unique Request ID. If a granule cannot be created, I-SIPS will keep trying for 24 hrs. After 24 hrs, a PDR will be placed in the output cache along with any successfully created granules.

p. 11 "QA Update Information" section has been enhanced. Science quality flag values have been defined.

p. 12 The keywords START_TIME and END_TIME have been added as optional on the mSCF PDR.

The following keywords are now on the mSCF PDR as well as the I-SIPS PDR:

- ORIGINATING_SYSTEM
- DISTRIBUTION_ID
- DATA_TYPE
- DATA_VERSION
- NODE_NAME
- DIRECTORY_ID
- FILE_TYPE

SUMMARY OF CHANGES SINCE VERSION 3.0

p. 6 New “PROCESSING” keyword added to the I-SIPS PDR indicating “NORMAL” processing or “EXPEDITED” processing for quick-look.

p. 7 New PDR file type added: LOG

p. 8 It will be a requirement that the I-SIPS will not create a bin/rev directory for GLA05 or GLA07 unless all 14 revs of GLA05 or GLA07 are available. If they are not all available for GLA05, then temporary bin/rev directories will be created for each altimetry product at the mSCF. Likewise, if all 14 revs of GLA07 are not available, then temporary bin/rev directories will be created for each lidar product at the mSCF.

p. 8 It is a requirement that there be only one product set delivered in a distribution. However, a product set may be delivered in more than one distribution.

p. 9 It is a requirement that a special request to the I-SIPS be delivered to the mSCF in one distribution.

p. 10 Expanded section on “Quick Look Data”.

p. 13 New “PDR_TYPE” keyword added to the mSCF PDR indicating that the PDR is accompanied by files in a “DISTRIBUTION” or is requesting files for a “REQUEST”.

p. 13 Added sections distinguishing the request PDR format from the distribution PDR format.

SUMMARY OF CHANGES SINCE VERSION 4.0

p. 8 Removed metadata and validation & verification files from list of files mSCF receives from the I-SIPS.

p. 8 The browse products are png files packaged into one HDF file per product file. The mSCF will transfer them to the web server where they will unpackaged and put into appropriate directories for viewing from the SCF website.

p. 8 The I-SIPS will also send tarred files with html and png files to update the I-SIPS display on the SCF website with. The mSCF will transfer them to the web server where they will untarred and put into appropriate directories for viewing from the SCF website.

p. 9 New data type “WEB” and file type “TAR” has been added in PDR for tar files designated for the SCF website.

p. 9 Removed file type “METADATA” from the PDR for metadata files.
Removed file type “QAP” from the PDR for validation & verification files.

p. 10 “The mSCF File Naming Convention” section has been taken from the *SCF Architectural Design Document* and updated.

p. 13 Removed “PDR_TYPE” keyword from mSCF PDR.

p. 15 Changed request PDR to POR (Product Order Request) and modified format.

p. 16 “The rSCF File Naming Convention” section has been taken from the *SCF Architectural Design Document.*

p. 16 Part number (pp) has been added to the rSCF file naming convention so multiple files can be created if a single file will exceed the 2 GB file size limit:

GLAxx_yymmddhh_tiiii.Pnnnn_pp_vv

p. 16 Added the naming convention for the SCF QA file.

SUMMARY OF CHANGES SINCE VERSION 5.0

p. 7 Moved “The POR Format” from section 5 to section 4.

p. 11 It is also an assumption that only GLAS standard data products files will be used to fulfill a special request.

p. 12 Updated “QA Update Information” section between the mSCF and the I-SIPS.

p. 13 Added “The QAUF Format” section

p. 16 Changed rSCF browse product naming convention. Also removed the naming convention for the SCF QA file since using the QAUF instead.

p. 17 If the products were expedited by I-SIPS due to a quick-look request, then “ql” will appear in the names of all the files in the product set after the request ID and before the “.” (i.e. GLAxx_yymmddhh_tiiiiql.Pnnnn_pp_vv).

p. 19 Updated “QA Update Information” section between the rSCF’s and the mSCF.

SUMMARY OF CHANGES SINCE VERSION 6.0

p. 6 Added SUB_DATA_TYPE = 1 – 6 for DATA_TYPE=GLA04 in I-SIPS PDR.

p. 9 At any time the mSCF may subscribe to additional products from the I-SIPS if a member of the GLAS science team determines that it is needed. Under these circumstances, the additional data are automatically transferred from the I-SIPS to the mSCF, but not saved at the mSCF. This is to ensure that the amount of disk space at the mSCF is sufficient for the duration of the mission.

p. 9 The following products have been added to the SCF's subscription to the I-SIPS: GLA02, GLA04, GLA07, ANC36, ANC44, ANC39.

p. 9 The following products have been added to the SCF's subscription to the I-SIPS: ANC04, ANC08, ANC09, ANC20.

p. 15 SUB_DATA_TYPE not added to mSCF PDR.

SUMMARY OF CHANGES SINCE VERSION 7.0

p. 6 Changed SUB_DATA_TYPE to DATA_SUBTYPE in I-SIPS PDR.
p. 7 Added RELEASE to POR format
p. 16 Clarified yymmddhh in rSCF file naming convention

SUMMARY OF CHANGES SINCE VERSION 8.0

p. 7 Added DATA_SUBTYPE to POR for GLA04

SUMMARY OF CHANGES SINCE VERSION 9.0

p. 11 BN files are created for each product so the mSCF file naming convention for them is BNzxx not BNx; likewise for GR files.

p. 16 Laser and reference orbit added to rSCF file naming convention

SUMMARY OF CHANGES SINCE VERSION 10.0

p. 16 Changed rSCF file naming convention.

SUMMARY OF CHANGES SINCE VERSION 11.0

p. 10 POD/PAD “Y” code added to mSCF file naming convention
p. 11 MSCF BN/GR files now have naming convention corresponding to GLA product
p. 16 POD/PAD “Y” code and release added to rSCF file naming convention

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SECTION 1: INTRODUCTION

1.1 Identification of Document

This document is identified as the GLAS Science Computing Facility's (SCF) Interface Control Document.

1.2 Scope of Document

This document only discusses interfaces that are pertinent to the SCF and its functions. When SCF interfaces are described in other ICDs, those documents are referenced rather than including the description in this document.

1.3 Purpose and Objectives of Document

The purpose of this document is to define the SCF interfaces, the data to be exchanged through the interfaces and the mechanism for exchange.

1.4 Document Status and Schedule

Version 1 of this document was released as a draft. Version 2 was released in August, 2001 with the first installation of the SCF software on the remote sites. Version 3 will be released in October 2001 corresponding to the version 2 installation of the SCF software on the remote sites. There will be at least one more version of this document released before launch. Table 1-1 "Document Delivery Schedule" lists the planned editions and updates for this document:

Table 1-1 Document Delivery Schedule

Edition/Revision Designation	Activity/ Delivery Dates
Version 1	April 2001
Version 2	August 2001
Version 3	October 2001
Version 4	May 2002

1.5 Document Organization

This document's outline is assembled in a form similar to those presented in the NASA Software Engineering Program [Information Document 2.3a].

SECTION 2: RELATED DOCUMENTATION

2.1 Parent Documents

a) ICESat Mission Operations Requirements Document, TBS.

2.2 Applicable Documents

a) Interface Control Document between the EOSDIS Core System (ECS) and the Science Investigator-Led Processing Systems (SIPS), IceSat Science Investigator-Led Processing System Data Flows, Volume XXXXX, #423-41-##, April 13, 2001, NASA Goddard Space Flight Center.

b) *GLAS Level 0 Instrument Data Product Specification*, Version 2.2, March 17, 1998, NASA Goddard Space Flight Center Wallops Flight Facility.

c) GLAS *Standard Data Products Specification* - Level 1, Version 3.0, November 2000, NASA Goddard Space Flight Center Wallops Flight Facility.

d) GLAS *Science Data Management Plan*, NASA/TM-1999-208641, Version 4, Volume 2, July 1999, NASA Goddard Space Flight Center Wallops Flight Facility.

2.3 Information Documents

a) SCF Architectural Design Document
b) SCF Operator's Guide
c) SCF Interface Software Update Document
d) SCF Interface Software Installation Guide
e) SCF Interface Software Detailed Design Document
f) SCF Interface Software Operator's Guide for rSCF
g) SCF Interface Software Operator's Guide for mSCF
h) I-SIPS Interface Software Operator's Guide for ISF
i) I-SIPS Interface Software Operator's Guide for UTCSR
j) *Interface Control Document Between I-SIPS/ISF and CSR*

SECTION 3: INTERFACE OVERVIEW

The GLAS Science Computing Facility (SCF) consists of three components: Operational, main, and remote. The operational SCF (in building 22, room 111 at GSFC) is that portion which runs the ICESat Science Investigator-led Processing System (I-SIPS). The remote SCFs (rSCF) consist of the facilities at the Principal Investigators' institutions. The main SCF (mSCF) (building 33, room B209A at GSFC) is that portion which distributes data to the science team either as full granules or temporal and/or geographic subsets, and provides software for data management and visualization.

The GLAS mSCF will serve as the interface for the GLAS science team to the GLAS standard data products produced by the I-SIPS. The mSCF will maintain on-line the GLAS level 2 and selected level 1b and 1a products received as subscriptions from the I-SIPS. All other products will be available via special request. The rSCFs will provide science quality flag updates and level 3 and 4 data back to the mSCF. The mSCF, in turn, will provide science quality flag updates and level 3 and 4 data back to the I-SIPS.

This document describes the interface between the GLAS mSCF and the I-SIPS and between the mSCF and the rSCFs. The document addresses:

1. Data transfer protocol between the I-SIPS and the mSCF
2. Subscribed data transfers from the I-SIPS to the mSCF
3. Special requests for data from the I-SIPS for granules already processed that do not exist at the mSCF
4. Quick look requests from the mSCF to the I-SIPS
5. Requests from the mSCF for information stored in the I-SIPS ORACLE database such as granule history, etc.,
6. Science quality flag updates from the mSCF to the I-SIPS
7. Level 3 and 4 data products from the mSCF to the I-SIPS
8. Data transfer protocol between the mSCF and the rSCFs
9. Subscribed data transfers from the rSCF to the mSCF
10. Special Requests from the rSCF to the mSCF
11. QA Update Information from the rSCF to the mSCF
12. Level 3 and 4 data products from the rSCF to the mSCF

The context diagram in Figure 3-1 illustrates the flow of data between the I-SIPS and the mSCF and between the mSCF and the rSCFs.

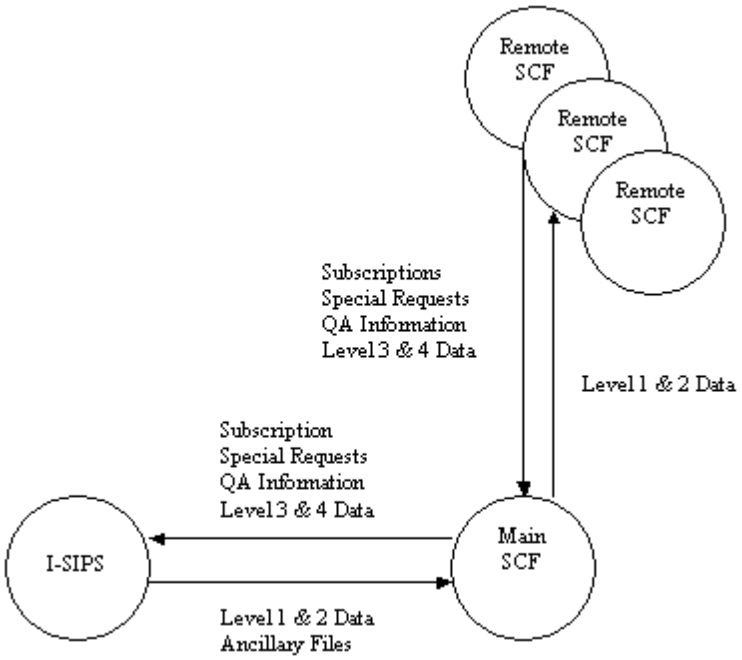

FIGURE 3-1 GLAS SCF CONTEXT DIAGRAM

Note: The Level 1 and 2 data delivered from the mSCF to the rSCFs includes associated files referred to as the Data Base Management System (DBMS). Refer to the *SCF Architectural Design Document* for information on the DBMS.

SECTION 4: I-SIPS - MSCF DATA INTERCHANGE DESCRIPTION

This section shall describe the data transferred between the I-SIPS and the mSCF.

4.1 Data Transfer Protocol between the I-SIPS and the mSCF

All data transferred from the I-SIPS to the mSCF will be put in the mSCF output cache on the I-SIPS and be pulled by the mSCF. A Product Delivery Record (PDR) will be placed in the cache listing the files contained in the distribution along with validation information. The PDR will also contain a unique distribution number assigned by the I-SIPS and when defined, the unique request ID assigned at the mSCF. Once the files and PDR are placed in the output cache, a PDR transfer file (XFR) is created denoting that the files and PDR are ready to be transferred. No file will be pulled from either the input or output cache until there is a PDR for the file and a PDR transfer file (XFR) present to ensure that the PDR file is complete. After the files have been pulled by the mSCF, the distribution will be checked for completeness against the PDR. The mSCF will place a Product Acceptance Notice (PAN) and its associated PAN transfer file (XFR) into the mSCF input cache on the I-SIPS. The PAN will indicate whether the files were successfully transferred or if an error occurred. If an error occurred, an e-mail will be sent describing, in further detail, the nature of the problem. If the files were successfully transferred to the mSCF, then the I-SIPS will remove the files from its output cache. If the file transfer was unsuccessful, then the I-SIPS will act accordingly.

Likewise, all requests sent from the mSCF to the I-SIPS will be put in the mSCF input cache on the I-SIPS. Each request will consist of a Product Order Request (POR) containing information about the products it needs from the I-SIPS. The POR will contain a unique request ID assigned by the mSCF and it is a requirement that when the I-SIPS fulfills the POR, that the same request ID be in the fulfilling PDR along with the files. An associated XFR will indicate the completion of the POR.

The I-SIPS PDR Format

The PDR will contain at least the following information:

- Unique distribution and/or request ID
- Total number of files in the set
- Number of PDRs in distribution
- File names
- File sizes
- File checksums

The PDR will be an ASCII file in the format described in Table 4-1.

Table 4-1 – Format of PDR for transmittal of data from the I-SIPS to the mSCF –

Capital letters denote keywords and must be typed as shown; a semicolon terminates lines. Blank lines and spaces before and after the equal sign are irrelevant.

Line #	Keyword	Value
1	ORIGINATING_SYSTEM=	ISIPS
2	DISTRIBUTION_ID=	Unique distribution ID assigned at the I-SIPS
3	REQUEST_ID= (not for subscriptions)	Special request ID assigned at the mSCF (only for special requests)
4	TOTAL_FILE_COUNT=	Number of files in this PDR 1-9999
5	DISTRIBUTION_PART=	PDR number in this distribution (i.e. 2_of_4)
6	PROCESSING=	NORMAL or EXPEDITED (for quick look)
7	TIME_STAMP=	Time of PDR creation in yyyy-mm-ddThh:mm:ssZ
8	OBJECT=	FILE_GROUP
9	DATA_TYPE=	Data type
10	DATA_VERSION=	Data version number
11	NODE_NAME=	I-SIPS host name
12	OBJECT=	FILE_SPEC
13	DIRECTORY_ID=	Directory on I-SIPS host where file is located
14	DATA_SUBTYPE	For data type = GLA04 only; 1 - 6
15	FILE_ID=	Name of file
16	FILE_TYPE=	File type
17	FILE_SIZE=	File size
18	FILE_CHKSUM=	File checksum
19	END_OBJECT=	FILE_SPEC
20-N	Repeat of lines 12-19 for each file	In the group
N+1	END_OBJECT=	FILE_GROUP
N+2	Repeat of lines 8-N+1 for each group	In the PDR

Note: If the keyword REQUEST_ID is present in the PDR, then the distribution is for a special request; otherwise it is for a subscription. It is a requirement that for a special request all data files are transferred in one distribution (the distribution, however, may be broken up into several PDR's).

The name of the PDR must have the extension ".PDR". Once the PDR is complete, a PDR transfer file (XFR) is created to indicate that the distribution set and the PDR are present and complete. The XFR file name is the PDR file name with the extension ".XFR" appended. It does not need to have a particular format, it only needs to exist. In practice, however, it usually contains one line, "PDR file completed".

If no files are produced for a special request, a PDR will be placed in the output cache with the SCF Unique Request ID, the I-SIPS-defined unique distribution ID, if it exists, and 0 for the number of files indicating that the request cannot be filled.

Refer to Table 4-3 for a correlation of file types, data types and the files they represent. File types and data types must be capitalized in the PDR.

The PAN Format

The PAN will be an ASCII file in the format described in Table 4-2.

Table 4-2 – Format of PAN for transmittal of data from the I-SIPS to the mSCF –

Capital letters denote keywords and must be typed as shown, lines are terminated by a semicolon. Blank lines and spaces before and after the equal sign are irrelevant.

Line #	Keyword	Value

1	MESSAGE_TYPE=	SHORTPAN
2	DISPOSITION=	Message indicating successful transfer or error
3	TIME_STAMP=	Time of PAN creation in yyyy-mm-ddThh:mm:ssZ

The name of the PAN must be the same as its corresponding PDR file, but end with the extension ".PAN" rather than ".PDR". Once the PAN is complete, a PAN transfer file (XFR) is created. The XFR file name is the PAN file name with the extension ".XFR" appended. It does not need to have a particular format, it only needs to exist. In practice, however, it usually contains one line, "PAN file completed".

Disposition messages may be one of the following:

- SUCCESSFUL
- POST-TRANSFER FILE SIZE CHECK FAILURE
- INCORRECT NUMBER OF FILES
- FILE I/O ERROR
- ALL FILE GROUPS/FILES NOT FOUND

A PAN with the disposition message of "SUCCESSFUL" means that the corresponding files can be removed from the output cache. If the PAN contains a different disposition message, then this indicates that a problem occurred, and an email will be sent describing the nature of the problem. The I-SIPS will investigate the problem, and the files in the distribution that were not transferred successfully will be transferred again.

The POR Format

The POR will be an ASCII file in the format described in Table 4-3.

Table 4-3 – Format of POR for requesting data from the I-SIPS –

Capital letters denote keywords and must be typed as shown; a semicolon terminates lines. Blank lines and spaces before and after the equal sign are irrelevant.

Line #	Keyword	Value
1	ORIGINATING_SYSTEM=	MSCF
2	REQUEST_ID=	Special request ID assigned at the mSCF
3	PROCESSING=	NORMAL or EXPEDITED (for quick look)
4	RELEASE=	I-SIPS release number; 0 indicates latest
5	TIME_STAMP=	Time of POR creation in yyyy-mm-ddThh:mm:ssZ
6	PRODUCT	Product type (i.e. GLA01)
7	DATA_SUBTYPE=	Data Sub Type for GLA04 only (1-6, 1=LPA)
8	SEGMENT=	Product segment
9	REFID=	Reference orbit ID in prkk format (i.e. 1101)
10	MIN_CYCLE=	Minimum cycle
11	MAX_CYCLE=	Maximum cycle
12	MIN_TRACK=	Minimum track
13	MAX_TRACK=	Maximum track
14-N	Repeat of lines 6-12	For each unique product/segment/refID/cycles/tracks

4.2 Data provided by the I-SIPS

The I-SIPS distributes the GLAS Standard Data Products in three ways: by subscription, special request, or by quick look request. The mSCF has a standing subscription with the I-SIPS for certain GLAS Standard Data Products and related information. To obtain products not included in the standing subscription, a special request must be submitted. The I-SIPS will fulfill the special request from the products it has already generated. If the requested products do not exist, then the special request cannot be filled. However, a quick look request may be submitted with approval of the Change Control Board (CCB). Upon approval, the quick look request forces the I-SIPS to create the products with any input data it has available, for instance, predicted orbit information rather than precision orbit information. This provides the user with a "sneak preview" of the data which should be replaced with real data when it becomes available.

Subscription Data

The mSCF has a standing subscription with the I-SIPS for certain GLAS Standard Data Products and related information. These will be sent as product sets. A product set consists of 14 revolutions of GLAS level 2, selected level 1a and 1b data, and the directories and browse products. The following products and granules will make up the subscription product set:

- GLA01 – segments 1 and 3 only (polar granules)
- GLA05 – segments 1 and 3 only (polar granules)
- GLA06 – segments 1 and 3 only (polar granules)
- GLA12-15 - all granules
- GLA08-11 - all granules
- Browse products for all GLAS Standard Data Products (GLA01-GLA15): even for products and segments not in the subscription
- A bin/rev directory based on all GLA05 granules
- A bin/rev directory based on all GLA07 granules

The above files (14 rev set) will be placed on the I-SIPS in the mSCF output cache upon completion of the automated quality assurance tests performed at the I-SIPS.

It will be a requirement that the I-SIPS will not create a bin/rev directory for GLA05 or GLA07 unless all 14 revs of GLA05 or GLA07 are available. If they are not all available for GLA05, then temporary bin/rev directories will be created for each altimetry product at the mSCF. Likewise, if all 14 revs of GLA07 are not available, then temporary bin/rev directories will be created for each lidar product at the mSCF.

During reprocessing, any granules and associated browse products and bin/rev tables that are remade that are normally under subscription will be sent. This may not include all the granules listed above since partial reprocessing of only selected granules can be invoked. These will be sent in 14-orbit packages.

It is a requirement that there be only one product set delivered in a distribution. However, a product set may be delivered in more than one distribution.

A product set (or any set of files in a distribution) may be split among several PDRs for ease in transferring data if the file sizes are long. However, since there is a unique

distribution ID associated with each distribution, files transferred separately may be correlated to a particular distribution using the distribution ID in the PDR. The keyword "DISTRIBUTION_PART" in the PDR gives the PDR number in the distribution (i.e. 2_of_4). This value is used by the mSCF to determine if all of the files in the distribution have been transferred and if not, which PDR hasn't.

In addition to the afore-mentioned product sets the mSCF will also have a subscription for versions of the ORACLE rev and the reference orbit tables, and the track files that are formed for each reference orbit.

A binary version of the ORACLE rev table will be transferred from the I-SIPS to the mSCF each time it is modified by the predict orbit utility software. An ASCII version of the ORACLE reference orbit table will be transferred every time it is updated. The track file will be sent every time the reference orbit utility is run to create one (once per reference orbit). Each file or set of files will be accompanied by a PDR with the aforementioned information.

The browse products are png files packaged into one HDF file per product file. The mSCF will transfer them to the web server where they will unpackaged and put into appropriate directories for viewing from the SCF website.

The I-SIPS will also send tarred files with html and png files to update the I-SIPS display on the SCF website with. The mSCF will transfer them to the web server where they will untarred and put into appropriate directories for viewing from the SCF website.

At any time the mSCF may subscribe to additional products from the I-SIPS if a member of the GLAS science team determines that it is needed. Under these circumstances, the additional data are automatically transferred from the I-SIPS to the mSCF, but not saved at the mSCF. This is to ensure that the amount of disk space at the mSCF is sufficient for the duration of the mission.

Table 4-4 below summaries the files that the mSCF has subscriptions for with the I-SIPS and the corresponding FILE_TYPE and DATA_TYPE as listed in the ORACLE database and in the PDR. Some data are under subscription only for a certain period of time; this is noted.

Table 4-4 - Summary of Files under Subscription with Data Types and File Types

File	DATA_TYPE	FILE_TYPE
GLA01	GLA01	SCIENCE
GLA02 (for cal/val only)	GLA02	SCIENCE
GLA04 (for cal/val only)	GLA04	SCIENCE
GLA05	GLA05	SCIENCE
GLA06	GLA06	SCIENCE
GLA07 (for cal/val only)	GLA07	SCIENCE
GLA08	GLA08	SCIENCE
GLA09	GLA09	SCIENCE
GLA10	GLA10	SCIENCE
GLA11	GLA11	SCIENCE
GLA12	GLA12	SCIENCE

GLA13	GLA13	SCIENCE
GLA14	GLA14	SCIENCE
GLA15	GLA15	SCIENCE
Browse products (.png files in HDF packages)	GLAxx	BROWSE
A bin/rev directory based on GLA05	GLA05	ANCILLARY
A bin/rev directory based on GLA07	GLA07	ANCILLARY
ICRF to ITRF Transformation Interpolation File	ANC04	ANCILLARY
Precision Orbits	ANC08	ANCILLARY
Precision Attitude	ANC09	ANCILLARY
Predicted Orbits	ANC20	ANCILLARY
Output from atmosphere utility	ANC36	ANCILLARY
RINEX GPS	ANC39	ANCILLARY
Reference Orbit Tables	ANC42	ANCILLARY
Track Files	ANC43	ANCILLARY
Output from atmosphere utility	ANC44	ANCILLARY
Tarred HTML and PNG files for website	WEB	TAR

The mSCF File Naming Convention

The names of the files at the mSCF will be dependent on the I-SIPS naming convention. The I-SIPS file naming convention is as follows:

GLAxx_ymm_prkk_ccc_tttt_s_nn_ffff.eee
where

- xx = Type ID number
- y = “Y” code that indicates calibration levels of POD and PAD. Refer to the “YXX Release Number Convention Document” for details.
- mm = Release number for GSAS version that created the product.
- p =Repeat ground track phase
- r= Reference orbit number
- kk=instance # incremented every time we enter a different reference orbit
- ccc = Cycle (000-999)
- tttt = Track (0000-2600)
- s = Segment, (0=none, 1-4 correspond to 50° lat/lon breaks)
- nn = granule version number (the number of times this granule is created for a specific release)
- ffff =file type. (numerical, CCB assigned for multiple files as needed for data of same time period for a specific HHHxx, i.e. multi-file granule)
- eee = file extension- dat for GLA01-15; qap for corresponding qap file; hdf for HDF browse packages; png for corresponding non-hdf browse files; vav for corresponding validation and verification file; met for metadata files

There are 4 segments in a track. The first one is from latitude 50 degrees towards the north to latitude 50 degrees moving south. The second one is from 50 degrees to –50

degrees. The third one is from –50 degrees to –50 degrees. The last one is from –50 degrees to 50 degrees.

The multiple .png file for GLA01, 02, 03 and 05-15 will use the ffff to denote the different files.

For the consolidated HDF browse product, one per GLAxx product file, the format is:

GLAxx _ymm _prkk_ccc_tttt_s_nn_dddd_ffff.eee

Where dddd = brws and eee = hdf.

For files that are exact duplicates of the I-SIPS files, i.e. the GLAS standard data products and the browse products, the name will be the I-SIPS name with the extension eee removed and "P" and PID appended.

Where

- PID is the unique product set ID of the format Pnnnn where nnnn is a unique number identifying that product set formed by incrementing the previous product set PID by one.

The Data base tables will be named as follows:

- pass table - same as the corresponding GLAS standard data product name with the GLA changed to PS and appended with PID
- Unique_rec_index table - same as the corresponding GLAS standard data product name with the GLA changed to UR and appended with PID
- Bin tables – same as the corresponding GLAS standard data product name with the GLA changed to BNA for altimetry products (GLA01,3-6,12-15) or BNL for lidar products (GLA02, 7-11) and appended with PID
- Georeference table - same as the corresponding Bin table name

Special Request Data

Standard Special Request Data

The files listed in the special request will be placed in the mSCF output cache as a distribution set. It is a requirement that a special request to the I-SIPS be delivered to the mSCF in one distribution. It is also an assumption that only GLAS standard data products files will be used to fulfill a special request. If a file in the request list has not yet been processed then it will not be sent. If none of the files requested have been processed then a PDR will still be placed in the output cache on the I-SIPS with the SCF Unique Request ID and 0 for the number of files so that the mSCF will know these files have not yet been created at the I-SIPS. The I-SIPS will not keep trying to fill this request. The mSCF will have to send another request for any of the files that were not available.

Quick Look Data

Based on the priority of the request, the I-SIPS will force processing of the requested files out of order, using expedited data if necessary, or processing partial granules if all input data do not exist. Once created, the files listed in the request will be placed in the mSCF output cache as a distribution set. Granules that can be created will be processed immediately and will be placed in the output cache along with a PDR containing the SCF Unique Request ID and the “PROCESSING” keyword set to “EXPEDITED”. If a granule cannot be created, I-SIPS will keep trying for 24 hrs. After 24 hrs, a PDR will be placed in the output cache along with any successfully created granules. If none of the granules in the request can be processed then a PDR is created with 0 for the number of files indicating that the request cannot be filled.

4.3 Data provided by the mSCF

Special Requests

Standard Special Requests

When the mSCF requires data that does not exist in its database, it will request the data from the I-SIPS by sending an SCF request file that is an ASCII file with a list of data set names. The data set names will be filled out except for version number and in some cases release number. The version number fields will always contain question marks. The release number field will either contain the specific release requested or question marks to indicate they desire the latest release. The file with the latest version number that matches the release requested should be sent. This SCF request file containing the incomplete data set names will be placed in the mSCF input cache on the I-SIPS along with a PDR that contains:

- The file name of the SCF request file
- Priority of the request (6 - 10) with TBD definitions
- Unique Request ID as set by the mSCF
- Number of files (1)
- File checksum

This type of request will use a priority that does not force data to be processed in an expedited manner or change the precedence of processing.

Quick Look Requests

The mSCF will submit the request for quick look in the same method as described in the previous section, except it will use a priority level that forces data to be expedited. Once the PDR is received, the mSCF should then confirm that the request was valid and resubmit or correct as necessary. The priority numbers for quick look data will be 1-5 with TBD definitions so that the priority number can be used to distinguish a quick look

request from a data request described for standard products.

Requests for Information Stored in the ORACLE Database

TBD. Add section on how the mSCF will request the I-SIPS for information contained in the ORACLE data base (history, etc).

QA Update Information

The mSCF will allow the science team to update product QA information via a page on the SCF website. Once the mSCF receives the submission, it updates the database, assigns a QA update ID and notifies the Change Control Board (CCB) and mSCF personnel. Some verification of the QA update will be made so that the CCB can determine if the QA update is valid. Once a decision has been made by the CCB, the database will be further updated with the date and the decision to accept the update or not. If the update has been accepted, the mSCF will create a QA Update Form (QAUF) for the I-SIPS with the parameters of the update. The QUAF will contain the QA update ID, product type, start and end times of the data in J2000 seconds, GLAS Science Algorithm Software (GSAS) release number, and the QA update value. The QAUF will be transferred to the I-SIPS in the same way as a PDR or POR would be, by placing it and an XFR in the I-SIPS distribution cache on the mSCF and transferring it to the I-SIPS ingest cache.

The QA update value will be used to update the SDMS granule table Scientific_QA_flag field. The I-SIPS will also update the metadata files and if the granule has been distributed to NSIDC, it will notify NSIDC to update the appropriate metadata.

The standard data products will be distributed with the value of "Inferred Passed". If the I-SIPS performs some QA and finds a problem, it will pull the granule from being distributed to NSIDC and the mSCF. When the I-SIPS provides the data to the mSCF, it will wait for a TBD time period before sending the data to NSIDC. If during this period the mSCF performs QA on the granule, it will notify the I-SIPS of the correct flag value to use. If the mSCF finds a major problem during this time period, it will send email to the I-SIPS asking that the granule not be distributed to NSIDC and suggesting steps to take. If the I-SIPS has already sent the granule to NSIDC, it will notify NSIDC to update the science quality flag. It is not planned for every granule to receive feedback either before or after it is sent to NSIDC.

The QAUF Format

The QAUF will be an ASCII file in the format described in Table 4-5.

Table 4-5 – Format of QAUF for sending product QA update information to the I-SIPS –

Capital letters denote keywords and must be typed as shown; a semicolon terminates lines. Blank lines and spaces before and after the equal sign are irrelevant.

Line #	Keyword	Value
1	ORIGINATING_SYSTEM=	MSCF
2	QA_UPDATE_ID=	Special QA update ID assigned at the mSCF
3	TIME_STAMP=	Time of QAUF creation in yyyy-mm-ddThh:mm:ssZ
4	PRODUCT	Product type (i.e. GLA01)
5	RELEASE=	GSAS release from product headers (i.e 2.2)
6	START_DATE=	Start date of date in J2000 sec
7	END_DATE =	End date of date in J2000 sec
8	QA_UPDATE=	Passed, Failed, or Inferred_Passed

Level 3 and Level 4 Data

The mSCF will provide Level 3 and 4 data to the I-SIPS by placing the files and a PDR in the mSCF input cache on the I-SIPS. Each PDR created on the mSCF side will have a unique distribution number assigned by the mSCF.

We should address if the level 3 or 4 products are in HDF_EOS (or format) ready to distribute or the I-SIPS is to reformat into HDF-EOS.

Once the I-SIPS has performed any required QA and/or reformatting it will distribute the products to NSIDC.

SECTION 5: MSCF- RSCF DATA INTERCHANGE DESCRIPTION

This section shall describe the data transferred between the mSCF and the rSCFs.

Data Transfer Protocol between the mSCF and the rSCFs

A separate output and input cache for each rSCF will be maintained at the mSCF. The institution named on the data request submittal will determine in which output cache the results are placed. The output of all requests will be placed in this cache as a set of files and a Product Delivery Record (PDR). The PDR will contain a unique request number assigned by the mSCF. Once the files and PDR are placed in the output cache, a PDR transfer file (XFR) is created denoting that the files and PDR are ready to be transferred. Once the files have been pushed to the rSCF, the distribution will be checked for completeness against the PDR. The rSCF will place a Product Acceptance Notice (PAN) and its associated XFR into the rSCF input cache on the mSCF. The PAN will indicate whether the files were successfully transferred or if an error occurred. If an error occurred, an e-mail will be sent describing, in further detail, the nature of the problem. If the files were successfully transferred to the rSCF, then the mSCF will remove the files from its output cache. If the file transfer was unsuccessful, then the mSCF will act accordingly. No file will be pushed from the output cache until there is a PDR for the file and a PDR transfer file (XFR) present to ensure that the PDR file is complete.

5.1.1 The mSCF PDR Format

The format for the mSCF PDR is the same as that for the I-SIPS PDR with some modifications. Refer to the section entitled **"The I-SIPS PDR Format"** for this PDR format. The differences between the PDR created at the I-SIPS and the distribution PDR created at the mSCF are listed below.

The following keywords may exist on the I-SIPS PDR, but do not exist on the mSCF PDR:

- DISTRIBUTION_ID=distribution ID
- NUM_PDR_IN_DIST=Number of PDR files per distribution ID
- DATA_SUBTYPE= 1 – 6 for DATA_TYPE=GLA04 only

The following keywords may exist on the mSCF PDR, but do not exist on the I-SIPS PDR:

- START_TIME=Start time of data in yyyy-mm-ddThh:mm:ssZ (in FILE_SPEC section)
- END_TIME=End time of data in yyyy-mm-ddThh:mm:ssZ (in FILE_SPEC section)
- SUBDIR= Subdirectory where files belong after push or pull (in FILE_GROUP

section)

The following keywords exist on the mSCF PDR and may exist on the I-SIPS PDR:

- REQUEST_ID= unique request ID assigned at the mSCF

Files are assigned data type and file type as they are at the I-SIPS. For files created at the mSCF, data type and file type are as follows:

For files starting with BN, GR, UR, PS:
- DATA_TYPE = product data type
- FILE_TYPE = ANCILLARY

Data provided by the mSCF

5.1.2 Subscription Data

Subscriptions will be automatically executed every time the mSCF receives a new product set from the I-SIPS. Files generated will be placed in the rSCF output cache on the mSCF as a product set. If any one file in this data set would exceed 2 Gbytes in size, then the subscription will be split by time to create multiple product sets.

5.1.3 The rSCF File Naming Convention

The rSCF file naming convention is as follows:

- GLAS standard data products - GLAxx_yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv
- Intermediate QA product – GLAxx_yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv.QAP
- Browse products – GLAxx_yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv_ffff.png
- Bin table - BNzxx_yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv
- Georeference table - GRzxx_ yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv
- Pass table - PSxx_ yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv
- Unique_rec_index table - URxx_ yymmddhh_tiiii_rww_lll.Pnnnn_pp_vv

Where

xx = GLAS Standard data product number (1-15)
yymmddhh -
For subscription data: date of the first data received from I-SIPS in the 14 rev product set
For special request data: date of the beginning of the first granule that is used to create the subset
t=type of request; s for subscription, r for special request
iiii is the subscription number or special request number
r = is the POD/PAD “Y” code of the first input file in the subsetted file. Refer to the “YXX Release Number Convention Document” for details.
ww is the GSAS release number of the first input file in the subsetted file.
lll is the laser campaign; i.e. L1A, L2A, L2B, etc.

Pnnnn – unique product set ID number, PID
ffff – file number to account for multi-file browse products
pp – part number of product file so multiple files can be created if a single file will exceed the 2 GB file size limit
vv- version of this file starting at 00
z- A for altimetry or L for lidar
png – indicates PNG file

Note for quick-look products: If the products were expedited by I-SIPS due to a quick-look request, then "ql" will appear in the names of all the files in the product set after the laser campaign and before the "." (i.e. GLAxx_yymmddhh_tiiii_rww_lllql.Pnnnn_pp_vv).

For subscriptions, the PID will be the same as for the corresponding I-SIPS files used to fulfill the subscription. For special requests, the PID will be unique.

If a data product file is calculated to exceed the 2 GB file size limit, it will divided into separate product files with incrementing part numbers.

Header records in each GLAS standard data product file will list the specific input parameters used to fill the request, and the I-SIPS input files used so the user can keep track of what I-SIPS versions went into each data set.

5.1.4 Special Request Data

Standard Special Request Data

Special requests will be executed on all product sets that exist at the time the request is received. One product set will be output with all the data unless any one file would exceed 2 Gbytes in size. If so, the special request will be split by time and multiple product sets created.

Quick Look Data

A quick look request is the tool the rSCF uses for requesting special processing at the I-SIPS. These requests must be approved by and given a priority by the special request board (details TBD). There are two types of quick look data that can be produced. Type one is when the I-SIPS has all the required input files but for some reason or other has not yet processed the data. This could occur during reprocessing where the priorities were not set in line with the science team member requesting this data, or if during normal processing something occurred to get the I-SIPS off schedule. For this type of data the output products will be of the same quality as if the data had been processed in sequence.

Type two is when all of the input files are not available and processing the data would result in some of the output parameters being undefined or of lower quality than normal. One situation this can occur under is if the team member is requesting processing of level 1b and 2 data before the precision orbit and attitude files are ready. The science

processing software, GSAS, can create the level 1b and 2 products using the predicted orbit. When this is done, however, the attitude information is not used at all and geolocation is accomplished assuming a nadir-pointing laser.

When the mSCF runs a subscription or a special request, the mSCF first checks if all files required to fill the request reside at the mSCF. If they do not, then a special request is sent to the I-SIPS for these granules as explained in section 5.1.2. Whether the data resides locally at the mSCF or only at the I-SIPS should be transparent to the rSCF user. The only affect this will have on the user is that it will take longer to fill their request.

Data Provided by the rSCFs

All science team requests for data originate at the rSCFs using the Data Request Interface installed on the remote site computer. Only the mSCF can request or receive data from the I-SIPS so the rSCFs have to send all requests to the mSCF. The Data Request Interface allows the user to select the type of request: subscription, special request, or quick look request. Then it sends email with the specifics of the request to the mSCF where it is automatically parsed, kept track of in a database, and assigned a unique ID. An acknowledgement of the request is then emailed back to the rSCF with the unique ID and an interpreted summary of the request. After the request is filled, the files created from the request are placed in the rSCF-specific output cache on the mSCF and pushed to the rSCF host.

5.1.5 Subscription Requests

Subscriptions are to be submitted to the mSCF for standing orders via the Data Request Interface. The GUI allows the user to select ICESat products by region, time, and/or set of tracks. Subscription type requests allow the user to input more than one time span for several years to allow for seasonal selection of a region over the mission lifetime.

5.1.6 Special Requests

Standard Special Requests

Special requests are to be submitted to the mSCF for desired data not under subscription via the Data Request Interface. The data request GUI allows the user to select ICESat products by region, time, and/or set of tracks.

Quick Look Requests

Quick look requests are to be submitted to the mSCF for desired data not under subscription via the Data Request Interface. The data request GUI allows the user to select ICESat products by region, time, and/or set of tracks. The only difference between a special request and a quick look request is that the user will be asked to

supply justification for the quick look request.

5.1.7 QA Update Information

The mSCF will allow the science team to update product QA information via a page on the SCF website. The user will complete the following fields:

- Product type (only one per submission)
- GLAS Science Algorithm Software (GSAS) release (from the product headers)
- Start and end times of the data in year-month-day or J2000 seconds
- User name
- Site name
- QA update value
- Justification: a description of why the data passed or failed, detailed enough to verify

The QA update values are:

- Passed - The granule has passed a specific science test
- Failed - The granule has failed a specified science test
- Inferred Passed

Pressing a submit button will send an email to the mSCF which will parse the email, update the database, assign a QA update ID to the submission, and send emails to Change Control Board (CCB) and mSCF personnel. Some verification of the QA update will be made so that the CCB can determine if the QA update is valid. Once a decision has been made by the CCB, the database will be further updated with the date and the decision to accept the update or not. If the update has been accepted, the mSCF will notify the I-SIPS with the parameters of the update.

5.1.8 Level 3 and Level 4 Data

TBD

APPENDIX A: ABBREVIATIONS & ACRONYMS

GLAS	Geoscience Laser Altimeter System
GSFC	Goddard Space Flight Center
ICESat	Ice, Cloud, and land Elevation Satellite
ISF	Instrument Support Facility
I-SIPS	ICESat Science Investigator-led Processing System
LIDAR	LIght Detection And Ranging
MIT	Massachusetts Institute of Technology
mSCF	Main Science Computing Facility
NASA	National Aeronautics and Space Administration
OSU	Ohio State University
rSCF	Remote Science Computing Facility
UCSD	University of California at San Diego
UTCSR	University of Texas Center for Space Research
UW	University of Washington
WFF	Wallops Flight Facility